

Office Memorandum • UNITED STATES GOVERNMENT

TO : Regional Director, Portland, Oregon

DATE: March 12, 1959

FROM : Refuge Mgr., Medicine Lake Refuge, Medicine Lake, Montana

SUBJECT: Supplemental Information for Long-Range Water Management Plan. (1-R)

Mr. MacDonald's March 4 memorandum outlines procedure for collection of required water data in the future, as a means of protecting and safe guarding our present water rights, for which we are very grateful.

However, we apparently failed in our February 24 memorandum to clearly indicate that we also needed some outline to show just how much of the information listed as required under Appendix B, Supplemental Directions for Preparing Water Management Plan, is needed to complete the Supplemental Water Management Plan for this refuge.

Paragraph (2) (a) of Appendix B, requests a statement showing the number of cubic feet of water per second used in the past five years and months in which such use occurred. We are at a loss to know how we can furnish this information, since the water we receive does not pass through any gates or weirs to permit measurement before entering the refuge. We could probably make an estimate of the number of acre feet received for each of these five years, but it would only be an estimate.

Paragraph (6) calls for a complete description of the basis for our water rights and their origin, their priority and preferential filings to be satisfied prior to our diversion. This is quite an order, since I have been told at our County Courthouse that they have several large books of water right filings and no one but an experienced person could make any determination of their priority or validity.

The need for clear understanding and safeguarding of our water rights is understandable and we are glad to help in any way we can, but do not feel that we are qualified to make any appraisal of these priorities or validities. A statement regarding the amount of essential information required for this Supplemental Water Management Plan will be appreciated.

Elmo G. Adams

Water Rights

Lamestoon

Water Rights Filing Number	USE	Source	Amount of water Right	Volume claimed AF/YEAR
1	F&W	Lamestoon Creek Lamestoon Lake	280 CFS	647

N.E. various methods

1	F&W	Carlson WPA unnamed center	Natural Flow	40.
2	F&W	Johnson Lake WPA unnamed center	200 CFS	1050



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LONG RANGE
WATER PLAN

LONG-RANGE WATER MANAGEMENT PLAN OUTLINE

I. Refuge Water Management

(A) History. Prior to the establishment of the Medicine Lake National Wildlife Refuge in 1935, the area consisted of numerous semi-permanent bodies of water and flat expanses of lowlands that retained shallow water levels after periods of heavier precipitation. Like other portions of the semi-arid northern Great Plains area, rainfall was usually scanty and wide fluctuations between extreme drought and heavy winter snows were common. The high evaporation rate during hot, dry summers brought about a concentration of alkaline mineral salts in the largest residual water area which was responsible for the appellation of "Medicine Lake" being given to the area.

The strategic location of the area, on the flyway south from the Canadian provinces, made a convenient stopping place for waterfowl during migration and in favorable years, a considerable nesting population remained on the area.

With increasing demands for agricultural lands, some attempt was made to lessen the water areas by construction of dikes and ditches, but little success attended these efforts and most of the area remained as a collection of alkali flats and shallow potholes until 1935. Then an Executive Order by the President set aside and reserved 23,700 acres as a refuge and breeding ground for waterfowl and other wildlife.

A system of dikes, canals and control structures built in following years, impounded run-off waters and created fairly permanent water areas to provide nesting habitat and resting areas for waterfowl and recreational facilities for the public. The Medicine Lake National Wildlife Refuge now consist of 31,457 acres, composed of 12,500 acres of water, 18,000 acres of pasture and meadowland and nearly 1,000 acres of farming plots. On the rolling upland and sandhil pastures, around 700 cattle graze during summer months, and from 1,500 to 2,000 tons of hay can



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usually be cut on the lower meadows. Strip farming is practiced by sharecrop permittees on the farming plots under a rotation plan that puts each acre into summer fallow or cultivated row crop during alternate years. The Government's share of the grain is either left standing for wildlife or harvested for wildlife feeding on other refuges. Approximately 3,200 acres are open for public hunting of waterfowl and ~~are~~ conveniently located recreational areas affords opportunities for boating, swimming and picnicking, all of which are heavily used by residents of surrounding areas.

As can be seen on the attached map, the Medicine Lake Refuge consists of two detached areas. The smaller Homestead Unit lies some four miles down stream (along the Muddy Creek drainage) from the larger Medicine Lake Unit.

Run-off water is supplied to the upper and larger unit by a diversion canal from Muddy Creek from the northwest and from Sand, Cottonwood and Lake Creeks from the east. The Homestead Unit is supplied by Muddy Creek, Lost Creek and Sheep Creek. None of the creeks mentioned can be classed as flowing streams since they are usually dry throughout most of the year.

In times of need, water can be released from Medicine Lake to offset evaporation losses in the Homestead Unit, but there is little opportunity to replenish Medicine Lake from the small shallow impoundments to the northeast.

Water management on this area is complicated by two factors -- scanty and unpredictable supply and lack of drainage. Normal yearly precipitation amounts to approximately 13 inches, with extremes ranging from 7 to 18 inches. To make planned management more difficult, precipitation patterns show a tendency for drought conditions to persist for several consecutive years. Since water for refuge impoundments comes only from run-off, with no "live" or permanent flows, any reduction in precipitation has an immediate effect on refuge water levels. This is especially noticeable when two or more "dry years" succeed each other. Under such conditions, evaporation losses also increase.



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The second obstacle to efficient water management is lack of drainage due to the flat character of the terrain. Geologists believe that the present Muddy Creek valley was formerly the bed of the Missouri River when it flowed northward to Hudson Bay. A very slight change in land levels now allows the Muddy Creek drainage to flow southward into the Missouri River. This situation has created many problems. In times of heavy run-off, flood waters back up in Medicine Lake and cause damage to roads, dikes and refuge headquarters buildings. Due to lack of fall, the unwelcome flood waters usually take several weeks to subside. Medicine Lake cannot be drained since there are large areas five or six feet lower than the outlet. The same situation prevents draining all of the impounded water in the eastern end of the refuge into Medicine Lake. One unit - Katy's Lake, has no outlet at all.

Despite lack of facilities for manipulation of water levels, there has been remarkably little trouble from botulism, algae poisoning or other water-related problems. Some botulism was encountered shortly after some of the new impoundments were created, but the outbreak quickly subsided and no trouble has been experienced for over fifteen years. During low water periods, heavy growths of various forms of algae have made the Medicine Lake area an unsightly and unsavory expanse that has greatly discouraged recreational use.

As a whole, the development of the refuge has contributed greatly to the economy of the adjacent area. Water controls have greatly increased waterfowl production and the more favorable environment along with the protection afforded by the refuge has created a home for upland birds, big game animals and furbearers. Use of the recreational facilities has increased greatly during recent years, with nearby communities joining with the Bureau in furnishing shelter buildings, docks and playground equipment. The public hunting area has also been enjoyed by local sportsmen. Controlled grazing and harvesting of surplus hay in favorable years has enabled many near-by stockmen to engage in cattle-raising and co-operative farming of refuge food plots has added to the income of others. Some protection from early fall frosts is also afforded by the water areas to near-by crop lands.

(B) Water Rights As is usually the case, established legal water rights are somewhat complicated and involved. As nearly as can be determined, the Bureau has the following appropriations, all filed with the County Recorder of Sheridan County on Nov. 7, 1936.

- | | |
|---------------------|-------------|
| 1. Cottonwood Creek | 100 c.f.s. |
| 2. Big Muddy Creek | 1200 c.f.s. |
| 3. Big Muddy Creek | 50 c.f.s. |
| 4. Lake Creek | 100 c.f.s. |



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5. Sheep Creek	20 c.f.s.
6. Lost Creek	25 c.f.s.
7. Sand Creek	75 c.f.s.

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Some prior claims have been filed, but information is lacking as to their present validity. However, the right of the Indian Service to use of water from Muddy Creek is of considerable importance to this refuge, especially since the principal source of supply for the Homestead Unit comes from Muddy Creek through use of the Indian Service Dam. A joint agreement with the Indian Service permits Bureau use of the dam and the water, at the pleasure of the Indian Service.

(C) Supply. As stated previously, sources of water for refuge impoundments depend entirely on run-off water which may, and usually does, vary greatly from year to year. As a rule, some run-off can be expected during the months of April, May or June but there have been springs when the run-off was negligible. Again, heavy run-off has been experienced during summer months after flash floods or cloudbursts in areas to the north and northeast.

Due to the variations in yearly precipitation and underlying ground stratas, little can be said regarding underground water tables. Layers of coal, salt, quicksand and gravel are found at varying depths in this area and present different angles to the water table picture. Generally speaking, ground water levels have dropped sharply in the past five years.

Judging from past records, the long range outlook for available water supplies seems to consist of a series of dry years interspersed with a few more favorable ones with little possibility of being able to change or predict the pattern.

(D) Other Management Considerations. As mentioned earlier, there is little opportunity to store water for extended droughts, and only limited possibility of improving conditions in some units without depleting the supply in others. As an illustration, the lowering of water in Medicine Lake to maintain desirable levels in the Homestead impoundments creates a serious situation from a public relations angle. The western end of Medicine Lake is very shallow and when levels are low, the area bordering on Highway 16 presents an unsightly expanse of mud flats with extremely offensive odor. The recreational area is also made unuseable when levels are too low. However, this situation does not exist during favorable years and desirable levels can usually be maintained in the Homestead Unit without drawing down Medicine Lake



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levels to a point where the situation becomes too offensive. The fact that the Homestead Unit is a valuable nesting and resting area makes it necessary to do everything possible to maintain production and use by waterfowl in that unit.

The possibility of the Indian Service making use of its dam and water for irrigation purposes is somewhat remote at this time, but the possibility exists, nevertheless.

Rough fish control is a recognizable problem, with little possibility of solution until some means can be devised for the prevention of an influx of carp and other rough fish from the Missouri River each time heavy run-off floods the entire Muddy Creek valley. It would be highly desirable to eradicate or control the present heavy carp population, if some feasible plan could be worked out to prevent reinfestation, in order to prevent the consumption of valuable aquatic food plants by carp and to permit the establishment of sport fishing that would fill a great need in this part of the state.

Weed control has never been a problem in this area.

(E) Map. The attached map shows the location of the various water areas of the Medicine Lake Refuge and the surface and outlet elevations. Also shown are several smaller impoundments created in recent years to store run-off waters and provide nesting and brooding areas for waterfowl.

(F) Recommendations.

(1) Objectives. The primary objective of planned water management on this refuge is to provide and increase facilities for waterfowl production. This can best be accomplished through providing suitable habitat consisting of adequate cover, food supplies and water areas that would be attractive to waterfowl. Maintenance of these facilities depends on water level manipulation, so far as practical. Most of the nesting and brooding areas have been established to conform to water levels existing in normal years or which can be maintained by controls afforded.

Production of aquatic food plants can be increased by (1) maintaining desirable water levels and (2) control of carp. Both of these practices must be embodied in any plans for increased waterfowl production.



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Supplemental food can be, and is made available for wildlife through farming of refuge food plots.

Additional or supplemental food for wildlife other than waterfowl can be provided by retiring some of the poorer farming plots and seeding them to clover, alfalfa or permanent grasses. Such seedings can be greatly benefitted by irrigation during periods of drought, and consideration should be given to possible flood or sprinkler system irrigation with water pumped from nearby refuge impoundments.

(2) Priority. In view of the limited possibilities for water control, it should be the first responsibility to store spring run-off water to the fullest extent without endangering other installations. Then to maintain a level in the Homestead Unit impoundments as near the approved level as possible, because of its high production potential.

Assignment of other priorities is difficult because of the uncertainty of water supplies for the various units and the difficulty of manipulating them. In general, it should suffice to say that priority should always be given to maintaining favorable levels for waterfowl use and aquatic food production and protection.

II. Unit Water Management

(A) Description. The various Ecological Units of Medicine Lake Refuge are shown on the attached map and are described as follows:

Unit No. 1 consists of all the area lying east of Medicine Lake and contains approximately 10,910 acres divided into 2,080 acres of water, 368 acres of cropland and 8,462 acres of upland. It contains Water Impoundments Nos. 9, 10, 11, and 12.

This unit provides good nesting areas and also provides the sportsmen with the Public Hunting Area, containing the old time favorite "Gaffney Pass". The uppermost impoundments are especially attractive to diving ducks. Numerous food plots are scattered along the shore lines of Water Impoundments Nos. 11 and 12. The Nos. 9 and 10 Impoundments are more shallow and lie almost wholly within the Public Hunting Area.



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Located as it is at the upper end of the refuge, this unit usually receives a little run-off each spring, but was almost totally dry in 1937. Because of its shallow depth, a lowering of water levels amounting to 2 feet would reduce the water area of Impoundment No. 9 and Gaffney's Lake approximately one half.

Unit No. 2. Consists of all of Medicine Lake and adjacent land areas. The total water area is approximately 8,508 acres and contains 109.1 acres of cropland and 8,343 acres of upland. It is chiefly valuable for a waterfowl resting area, although a considerable number of ducks and geese are produced each year. The greatest depth, when Medicine Lake is full, is about 12 feet, over a considerable area in the eastern end of the lake. The western portion is quite shallow.

Medicine Lake was entirely dry in 1937 and again in 1900. On several occasions in recent years the surface level has dropped 4 feet or more. Water ceases to flow from the outlet when the level has dropped 5 feet.

The Diversion Canal from Muddy Creek empties into this unit and some control over the amount of water that can be diverted from Muddy Creek is afforded by the Dam No. 1 and the new control structure erected across the mouth of the Diversion Canal in 1957.

Prolonged drought affects this unit greatly, and because of the large evaporating surface, summer loss is always very heavy.

A drop of 2 feet in surface level only decreases the size of Medicine Lake slightly, but a drop of 4 feet or more brings a considerable reduction.

This unit contains the Refuge Headquarters and the largest Recreational Area, where fishing is permitted during summer months. However no fish other than carp or suckers have been taken for several years.

Surplus water from Unit No. 1 is allowed to run into Medicine Lake but the storage capacity of Unit No. 1 is not great enough to allow release of enough water into Medicine Lake to have any beneficial effect at other times.



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Unit No. 3 is the smallest of the three Ecological Units, but has a high waterfowl production potential. It consists of 1200 acres of water, 167 acres of cropland and 1,893 acres of upland. This unit is separated from the balance of the refuge by a distance of three miles at the closest point.

Water for this unit is taken from Muddy Creek by closing the Indian Service dam. Some water is supplied by occasional flash floods coming down Sheep and Lost Creeks. This unit is very shallow and a drop of two feet in surface level will reduce the water acreage by about 20%. Lowering another foot would reduce the area by one half.

~~A small Recreational Area is afforded by this unit and~~ A few grain plots provide food for waterfowl. Considerable shallow marshy areas in this unit make it very attractive for waterfowl, both during the nesting and migratory seasons. Some of the best waterfowl food of the entire refuge is afforded by the stands of sago pondweed and prairie bulrush. Maintenance of these food supplies requires careful management of water levels. This is usually accomplished through release of water from Medicine Lake into Muddy Creek. No means of completely draining the water from the Homestead Unit impoundments is provided by present control structures.

(B) Manipulation.

Management or manipulation of water levels on the Medicine Lake Refuge has been mentioned in previous paragraphs, and can best be summed up by saying that it is limited to storage of as much available water from run-off as possible and making it do the greatest amount of good in so far as facilities will permit. Maintenance of water levels that have been found to be most desirable is, of course, essential when it is possible to exercise any control.

(C) Recommendations.

- (1) Water levels that have been generally maintained, so far as possible, are shown on the Record of Gauge Readings sheet attached to the map.

B. Manipulation

Katy's Lake, Ecological Unit No. 1, operational level 1954.00'.

Homestead Impoundment, Ecological Unit No. 3, operational level 1937.65'.

Map insert prepared by M.W.



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(2) Supplementary management has been pretty well accomplished on this refuge, in so far as seeding, weed control, island development etc are concerned. At least these points have been given consideration so far as available funds will permit. However, repair or replacement of the Indian Service dam at the Homestead Unit will have to be given consideration in the very near future. Steps should be taken without delay, to determine the participation (if any) that could be expected from the Indian Service. This structure was repaired in 1941 by the Fish and Wildlife Service, but it was only a repair job and faulty concrete used in the original structure is beginning to show signs of deterioration and cannot be expected to endure the battering of ice and flood water much longer.

It is also believed that the present program of erecting low-cost check dams across draws and gullies to hold back run-off water and provide small brooding areas for waterfowl should be continued as long as suitable locations can be found and funds can be provided. Although most of the available sites for low-cost check dams have been utilized, it is believed that the waterfowl attractions of this refuge can be increased by further construction of this type.

Acquisition of additional lands to the northeast would also permit development of these pot-hole areas and an extension of some of the present water areas.

Respectfully submitted,

January 13, 1959

Elmo G. Adams, Refuge Manager

*Updated 5/1/60 whenever on project
as prepared by S. C. Adams, Refuge Manager*

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OBSERVER

	1943.00	1937.85	1945.00	1952.54	1954.00	1953.00	No Gage	No Gage
1942.32	1931.40	1932.30	1941.83	1947.62	1949.86	1953.00	1934.0	
1942.32	1931.40	1932.30	1941.83	1947.62	1949.86	1953.00	1934.0	/
1948.20	1943.02	1937.85	1945.00	1952.54	1955.93		1939.0	

NOTE- SEE REVERSE SIDE OF THIS SHEET FOR INSTRUCTIONS 49 MIS EN